RECENT CHANGES IN THE CRATER OF STROMBOLI.[1]

STROMBOLI is the most easterly and northerly of the Lipari Islands. It is situated north of Sicily, close to the track of steamers plying between Naples and the Straits of Messina, and is thus an object familiar to passengers to or from Egypt or the East, though comparatively few have landed on its shores. Its almost constant eruptions have gained it the name of the lighthouse of the Mediterranean. It is almost circular, as its old name Strongyle indicates, and rises as an irregular cone out of deep water. On the north-west side are the crater, and the Sciara or steep slope down which the ejecta roll into the sea.

FIG. 1.—Stromboli. The Sciara from the North-east.

The summit of the mountain, which is about 3000 feet high, consists of a crescentic ridge, the Serra di Vancori, open towards the north. It forms part of an old crater ring, and thus presents points of similarity to Somma. Inside the crescentic ridge, and in places joined to it by irregular crests of rock, but mainly separated from it by a valley, "A Fossieiedda," similar to the Atrio del Cavallo of Vesuvius, is another crescentic ridge, connected with the two extremities of which, and immediately overlooking the sides of the crater, are two conspicuous pointed rocks, the Torrelle, which partly obstruct the view of the crater when viewed from the cliffs overlooking the Sciara on its north-east and south-west respectively. These Torrelle, being practically unaltered by ordinary eruptions, present good points of comparison for estimating the changes that take place, and one or other of them is included in most of the photographs. Between the two Torrelle, in the midst of a sort of amphitheatre formed by them and the crescentic ridge last mentioned, are the crater and its appurtenances, the "Apparato Eruttivo" of Italian observers. This amphitheatre is open to the north-west, and from its open side beyond the craters the steep slope of the Sciara extends down into the sea. This slope is bounded on each side by two steep cliffs, Filo di Sciara and Filo di Baraona, which are formed, like the Sciara itself, of lava-streams, agglomerates, and dykes; in fact, of almost every kind of compact volcanic material, chiefly of basic composition.

This Sciara, as is well known, is one of the most peculiar features of this volcano. It extends at an angle of about 35°, which is the "angle of repose" for the kind of material of which it is composed, down into the deep water of the Mediterranean; and though the volcano has certainly been in almost constant eruption during the whole of the historic period, and probably much longer, it has never been able to build up a talus sufficient to rise to the level of the sea, much less to that of the lip of the crater, about which, according to the analogy of other volcanoes, it might have been expected to have built up a cone on this side comparable to the portion on the south described above. Fig. 1, from a photograph[1] taken by the author in 1888 from the ridge overlooking the north-east side of the Sciara, and consequently looking south-west, shows the Sciara extending down to the right of the picture with the Filo de Barcuna behind it. The pointed rock to the left of the picture is the eastern Torrella, with a gap to the left of it through which the ejecta are thrown during the larger eruptions, and roll on to the steep slopes in front and down the Sciara into the sea. The western Torrella is just visible in the distance beyond the eastern Torrella. The crater situated between the two was in 1888 a large pit obviously formed by severe explosions. It contained two small secondary cones. One, towards its western part, and close to the edge of the Sciara, was that from which the explosive eruptions took place several times an hour; the other, towards the eastern part, emitted only smoke.

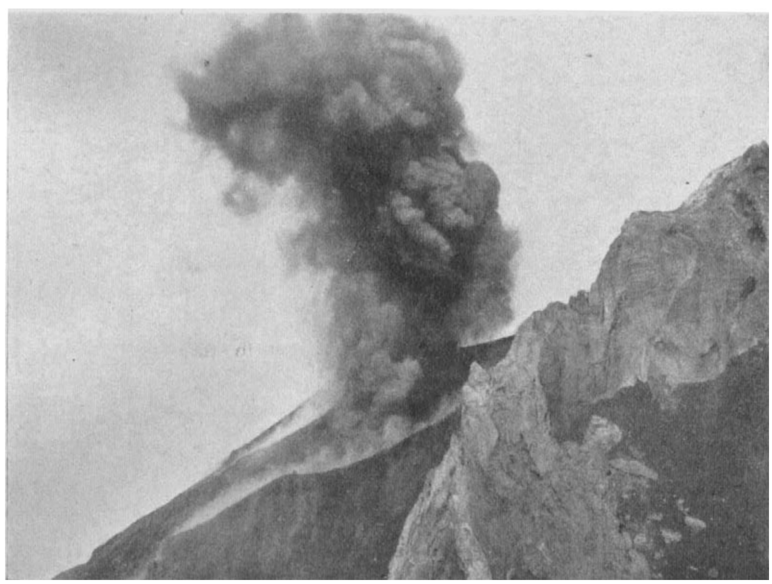

FIG. 2.—Stromboli. The Sciara from the West.

[1] Abridged from a paper by Dr. Tempest Anderson in the *Geographical Journal* for February.

[1] From "Volcanic Studies," by Tempest Anderson, plate xxi.

In 1904, when the author took comparison photographs from nearly the same spot, this large crater was almost entirely filled up, and the slope of the Sciara was continued upwards, so that the cone of ejecta overtopped and was visible behind the eastern Torrella. The activity in this eastern part of the crater still maintained the same quiet character as in 1888. The whole area constantly emitted vapour; there was more than one bocca visible, but they were quite small and only gave very feeble explosions, and these with a rhythm quite independent of those at the western part of the crater.

Fig. 2, taken by the author on April 20, 1904, from a point to the west of the crater, and consequently in almost exactly an opposite direction to Fig. 1, shows the condition of the western part of the crater sixteen years later. The conspicuous rock to the right of the plate is the western Torrella, behind which, in 1888, was the great crater above referred to. The bocca to the left, from which the explosion is taking place, is shown in some of the earlier photographs as situated on the edge of the large crater at its junction with the Sciara. The great crater is now seen to be filled up by ejecta which prolong the slope of the Sciara upwards over what was previously its site, while the bocca itself remains in all probability really in its former position, though apparently on the slope of the Sciara instead of on its edge.

It will be interesting to future visitors to see whether the volcano will continue to prolong the slope of the Sciara much further upwards, or whether a paroxysmal explosion will occur which will clear the great crater again.

The paper in the *Geographical Journal* is illustrated with twelve photographs and a map showing these and other points more in detail.

THE INSTITUTION OF NAVAL ARCHITECTS.

THE annual spring meeting of the Institution of Naval Architects was held last week, commencing on Wednesday, April 12, and being continued over the two following days. The president of the institution, the Right Hon. the Earl of Glasgow, occupied the chair. A very full programme had been arranged, there being no less than fifteen papers set down for reading and discussion, and there was also the presidential address.

The first business after the usual formal proceedings was the reading by the secretary, Mr. R. W. Dana, of the report of the council. By this it appeared that the institution is in a prosperous condition, both in regard to finance and membership. Reference was made to the proposed foundation of an experimental tank for the purpose of scientific investigation of problems connected with ship design. It will be remembered that it was proposed, at the initiative of Mr. A. F. Yarrow, Dr. Elgar, Sir William White, and other prominent members of the institution, that an institution tank should be founded in connection with the National Physical Laboratory. Such a tank, devoted to research of a scientific nature, would be of great benefit to the ship-building industry, and would do much to raise naval architecture to a higher plane by the substitution of scientific principles for those empirical methods upon which ship designers too largely have to rely. It is much to be regretted, therefore, and not very creditable to an important and wealthy industry, that the appeal made by the council of the institution has met with so poor a response. Only six thousand pounds out of the fifteen thousand pounds needed has been underwritten, so that the project is shelved for the present. In spite of the enormous preponderance of the ship-building interests of this country, there are but two experimental tanks in the kingdom. One is the property of the Government, and is devoted wholly to the Royal Navy, the other being the property of a private firm of ship-builders on the Clyde. Both these tanks are devoted entirely to what is known as "practical work," that is to say, they attack subjects piecemeal, and therefore in a more or less empirical fashion. They have no time for ordered investigation of fundamental principles, upon a knowledge of which, alone, can a useful superstructure of applied science be raised. The tanks are not to blame for this. They were established for a definite purpose, which they admirably fulfil.

In the presidential address Lord Glasgow, among other subjects, referred to the spread of the steam turbine for marine propulsion, alluding more particularly to the recent trials of H.M.S. *Amethyst*. Some interesting comparisons were made between the performances of this cruiser, which is fitted with steam turbines, and the *Topaze*, a similar ship in all respects, excepting that she has ordinary crank and cylinder engines. As is well known, the steam turbine is less "flexible," to use an expression that has come into use, than the reciprocating engine; that is to say, its efficiency falls off rapidly when it is run at lower powers than that for which it was designed to give maximum efficiency. This point was well illustrated during the trials of the *Amethyst* and the *Topaze* by the coal consumption, the figures being given in Lord Glasgow's address. The steam turbines of the *Amethyst* drove her at 23½ knots, 5·45 per cent. faster than her sister ships with reciprocating engines. At the higher speeds the turbine engines appeared decidedly more economical; at lower speeds the reciprocating engines had the advantage. At 10 knots a ton of coal would carry the *Amethyst* 7·42 miles, or the *Topaze* 9·75 miles. From this speed upwards the margin in favour of the reciprocating engines decreased, until the consumption curves would cross at a little above 14 knots, when approximately 6½ miles would be steamed on a ton of coal. At a speed of 20 knots the *Amethyst* ran 4·22 miles, and the *Topaze* 2·9 miles, per ton of coal burnt. At 23·6 knots, a speed the *Topaze* did not reach, the *Amethyst* would steam a little more than 2 miles per ton of coal. If it may be allowed that about 14 knots is the lowest speed at which these cruisers could be advantageously run in time of war, the steam turbine has a marked advantage for warlike purposes; but it might lead to higher coal consumption in time of peace.

The first paper taken was a contribution by Mr. W. E. Smith, of the Admiralty, upon the design of the Antarctic exploration vessel *Discovery*. This was a single screw wooden steamer 175 feet long, 34 feet wide, and about 1620 tons displacement. The propeller was so arranged as to be disconnected from the shaft and lifted into a well, after the manner adopted in the old steam frigates. The rudder was also arranged to be readily unshipped. The scantling of the hull was massive, but in general plan followed the designs adopted in the days of wooden construction. The vessel was fully rigged as a barque. The fitting of a magnetic observatory was one of the special features of the design. The work done here was of great magnitude, and the observations taken are now being analysed by Captain Chetwynd, the Admiralty superintendent of compasses. No magnetic metal was allowed within a radius of 30 feet of the observatory. Main shrouds were of hemp, the lanyards being rove through wooden dead eyes. Great care was taken to lag the living part of the ship so as to economise coal. Professional details of the design were dealt with at some length. In the discussion on this paper, Sir Clements Markham gave some historical details of former Polar expeditions, and dwelt upon the advantage of having a ship expressly built for the purpose. Captain Scott, who was in charge of the expedition, Sir William White, and Admiral Fitzgerald also spoke.

The next paper was by Colonel Soliani, of the Royal Italian Navy, and gave technical details of the Japanese war vessels *Kasuga* and *Nisshiu*, both built in Italy. A paper by Mr. H. Rowell giving an account of the Russian Volunteer Fleet followed.

The second day of the meeting opened with a paper by Prof. J. H. Biles, who gave details of trials made to test the strength of a torpedo-boat destroyer supplied for the purpose by the Admiralty. The vessel was placed in dry dock, being supported on cradles near the ends, so as to produce sagging stresses, and in the middle in order to induce hogging. The experiments were part of the investigation of the Admiralty Destroyer Committee. The results were set forth at considerable length in the paper and in the large number of diagrams which accompanied it. It will be sufficient to say here that the actual results observed on these practical trials established the usual methods of calculation as affording a good margin of safety, the stresses in the observed results being consistently below those calculated by the formulæ commonly used by naval architects.